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RECENT LITERATURE.

GRAY'S "ELEMENTS OF BOTANY."¹—This is a thorough revision of the deservedly well-known *Lessons* in which, for almost a generation, American botanists have made their first acquaintance with elementary botany. In the revision the venerable author reverted to the title of his first book, which appeared fifty-one years ago! Naturally, this coincidence of names suggests a comparison of the two books.

The first *Elements* was a duodecimo of four hundred and twenty-six pages, and was brought out by the house of G. & C. Carvill & Co., of New York, in 1836, the preface bearing date of April of that year. There is a good deal of similarity between this pioneer and the book which now, after the lapse of half a century, bears its name; and still there are very many differences.

In the early book the word protoplasm did not occur, for the very good reason that Mohl had not yet coined it; nor is there any direct reference to the thing, while in the present work protoplasm, cells, cell-contents and cell-walls, receive sufficient attention to give the beginner a general knowledge of what they are.

Vegetable physiology was very crudely treated in the earlier book, the extensibility, elasticity, hygroscopicity, endosmosis and excitability of plant tissues being gravely discussed in a way in striking contrast with the admirable summary given in Section XVI. of the later work.

In the first *Elements* "spongioles" were still supposed to be the organs of absorption in roots, and there was supposed to be a distinct ascending and descending sap in the stem. The turpentine of the Conifers and the latex of various plants were considered to be special kinds of descending sap. The movements of plants were discussed as among the curious things, but the meaning or purpose of the movements was not suspected. In describing *Dionœa muscipula*, it was said of the unfortunate insect that its "only chance of escape consists of remaining perfectly quiet until the leaf uncloses"! Pollination was, of course, treated in the old way: the Barbary stamens were said to "seldom fail to project a quantity of pollen upon the stigma," and it was stated that "the relative position of the anthers and stigmas is generally such as to favor mechanically the application of the pollen to the latter."

Turning to the new book, one sees what a great advance has been made in this field—which we may call Darwinian botany—in which such terms as close fertilization, cross-fertilization, cleis-

¹ *The Elements of Botany, for Beginners and for Scholars.* By Asa Gray. Ivison, Blakeman & Co., New York and Chicago. 1887. 8vo., 226 pp.

togamy, anemophilous and entomophilous flowers, dichogamy, heterogamy, etc., etc., occur. Not less striking is the contrast between the new and the old in the chapters which treat of the flowerless plants. Half a century ago the spores of the Equisetaceæ were still doubtfully discussed: the sporangia of ferns were supposed to be transformed leaves, and the search for their stamens and pistils had scarcely been given up. In these and the mosses—in fact, throughout the whole of the Cryptogams—there was no hint, as yet, of sexual organs. Compare these crude paragraphs with the concise and lucid exposition given in the new *Elements*, where the same groups of Cryptogams are discussed—but how differently! Pteridophytes and Bryophytes are given modern characters and a modern treatment. Thallphytes are briefly treated under Algæ, Lichens and Fungi, although with the statement that “of late it has been made most probable that a lichen consists of an alga and a fungus conjoined;” and, further, that “botanists are in the way of bringing out new classifications of the Thallophytes, as they come to understand their structure and relations better.”

When the earlier book was written Linnæus had been dead but sixty years, and his system had still so strong a hold that eighteen pages were given to an exposition of it and a discussion of the question of supplanting it with something better; and the Natural System stood so much in need of argument that forty-four pages were given to it. In the new book a short paragraph is all that remains of the discussion of the Linnæan System, and less than two pages suffice for the Natural System.

It need only be said that not only do these contrasts show us what advances have been made in botany in half a century, but a comparison of these two books shows, still more, the remarkable growth and perennial youth of the master-mind who wrote them. It is not given to many men to live to see such great changes in the aspect of a science as has been the good fortune of Dr. Gray, and still fewer have had the strength or ability to adapt themselves to the new views and theories.

The new book has so much to commend in it that we are loath to lay it down. We particularly like these sentences in the preface: “No effort should be made to commit technical terms to memory. Any term used in describing a plant or explaining its structure can be looked up when it is wanted, and that should suffice.” And this one, on page 156: “Even the beginner in botany should have some idea of what Cryptogamous plants are, and what are the obvious distinctions of the principal families.” We like the adoption of the spelling, Phanerogam, and the names Pteridophyta and Bryophyta, and the abandonment of the “superfluous” terms *frond* and *stipe* and replacing them with *leaf* and *petiole*, in describing the structure of ferns.—*Charles E. Bessey.*